DCP Development

WHAT IS A DATALINK CONTROL PROCESSOR?

NOT! An Operator Position

SATCOM

Future

TCDL

UPLINK

DOWNLINK

Closed-loop communication and control

TCS Core Processing Suite

AVSI

** DCP

IDT

OR

Legacy GDT

Real-time and Non-Real-time Processing

Communication with the TCS core processing suite via AVSI

Real-time Processing

Control of ground-based legacy datalink components

DCPs :

- Insulate TCS Core from A/V specific interface peculiarities by maintaining closed-loop control and communication with A/V following A/V's protocols, timing and encoding methods

- Maintain communication with and pass data to and from TCS Core via AVSI format

- Provide direct control of legacy datalinks

** Additional A/V specific functions as required (only those outside of TCS Core / Common functions)

HARDWARE VS. SOFTWARE DCP

- **DCP software only solution planned for TCS Block 3**

- **TCS Block 1 Version 2 not totally defined**
  - **Waiting for TUAV Block 2 study results**
  - **Results of testing**

- **If possible, software DCP solution could be accelerated into TCS Block 1 Version 2**

- **If not, requires single VME slot**
  - **No additional footprint**
  - **No significant power requirements**

- **TCS owes complete schedule by end of TCS B1 DT**
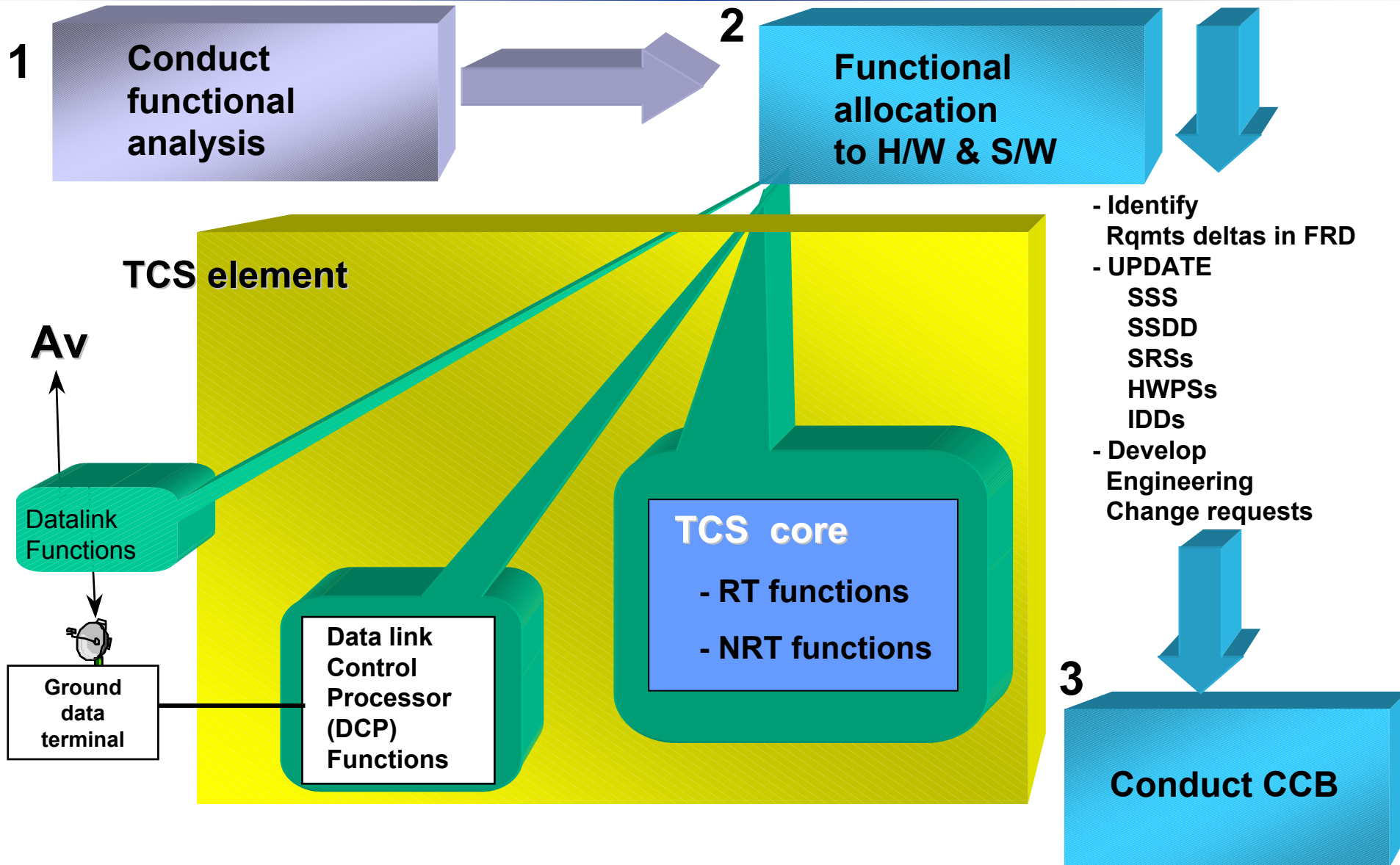
STANDARDS COMPLIANCE

- **TCS is fully DII/COE compliant**

- **TCS will be fully certified as a DII/COE segment**

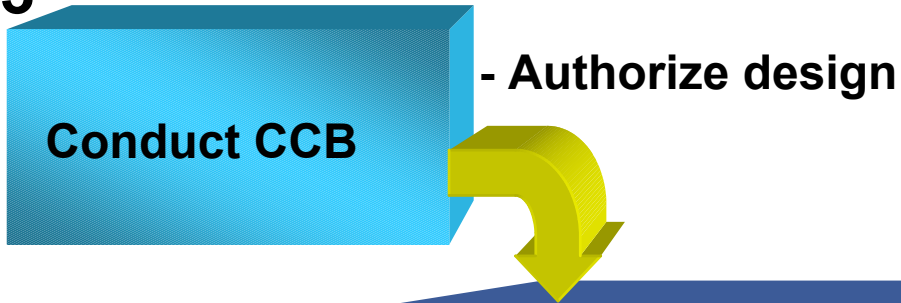- **Y2K compliant**

- **CIGSS compliant**

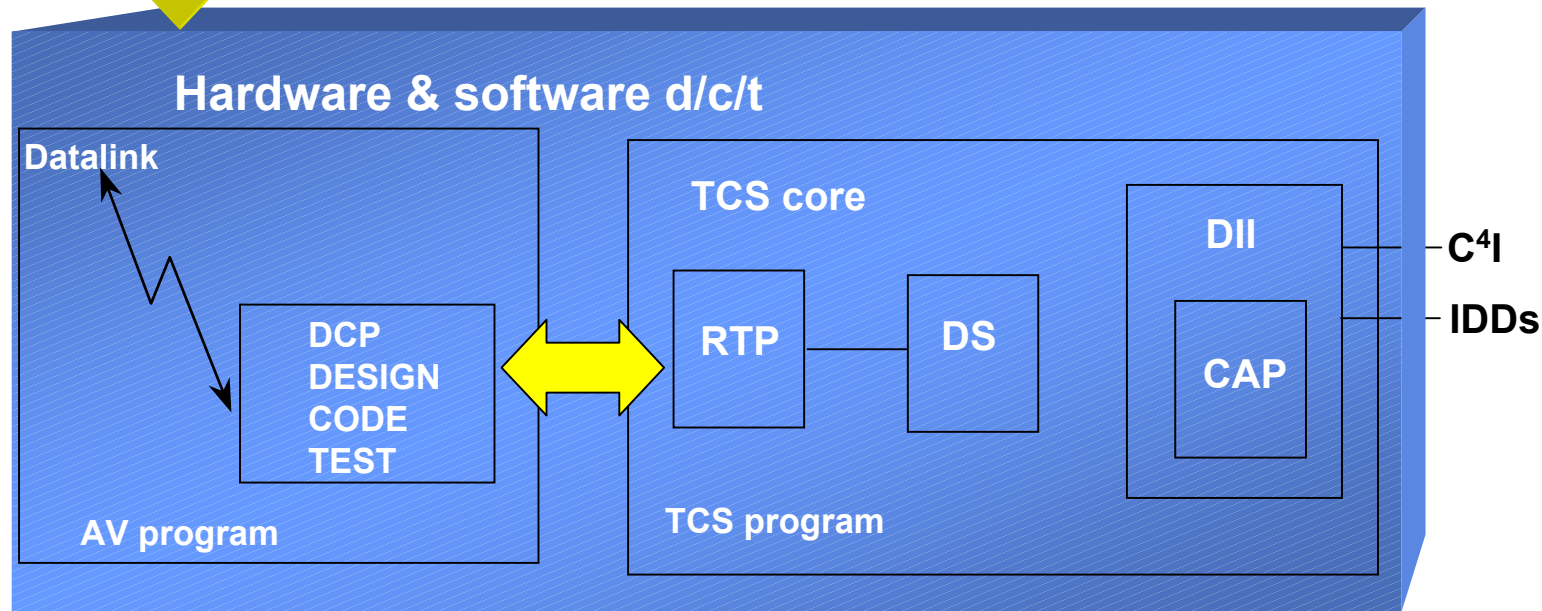- **JTA compliant**

NEW AV INTEGRATION PROCESS

1 Conduct functional analysis

2 Functional allocation to H/W & S/W

- Identify Rqmts deltas in FRD
- UPDATE
    SSS
    SSDD
    SRSs
    HWPSs
    IDDs
- Develop Engineering Change requests

TCS element

Av

Datalink Functions

Ground data terminal

Data link Control Processor (DCP) Functions

TCS core

- RT functions

- NRT functions

3 Conduct CCB

NEW AV INTEGRATION PROCESS

3

Conduct CCB

- Authorize design

4

Hardware & software d/c/t

Datalink

AV program
- DCP
- DESIGN
- CODE
- TEST

TCS core

RTP — DS

TCS program

DII

CAP

— C^4I

— IDDs

DCP
- **TCS integrator provide DCP requirements**
- **AV prime design & provide DCP H/W & S/W**

TCS core
- **Reuse core TCS**
- **Update/modify TCS core to meet functional requirements**

NEW A/V INTEGRATION PROCESS

5

Datalink Control Processor (DCP)

TCS CORE

Integrate DCP & TCS core and conduct system FQT

6

UAV weapon system

AV

GCS **TCS ELEMENT**

Ground Data Terminal

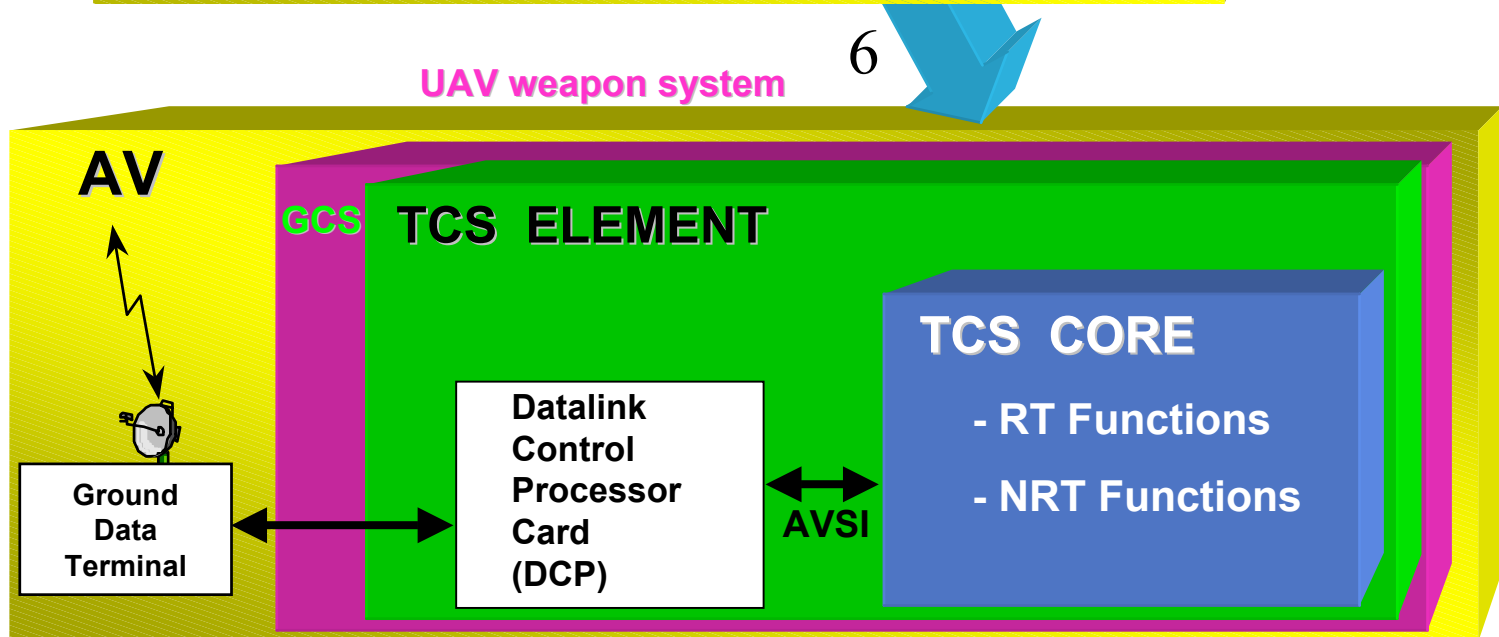Datalink Control Processor Card (DCP)

AVSI

TCS CORE

- RT Functions

- NRT Functions
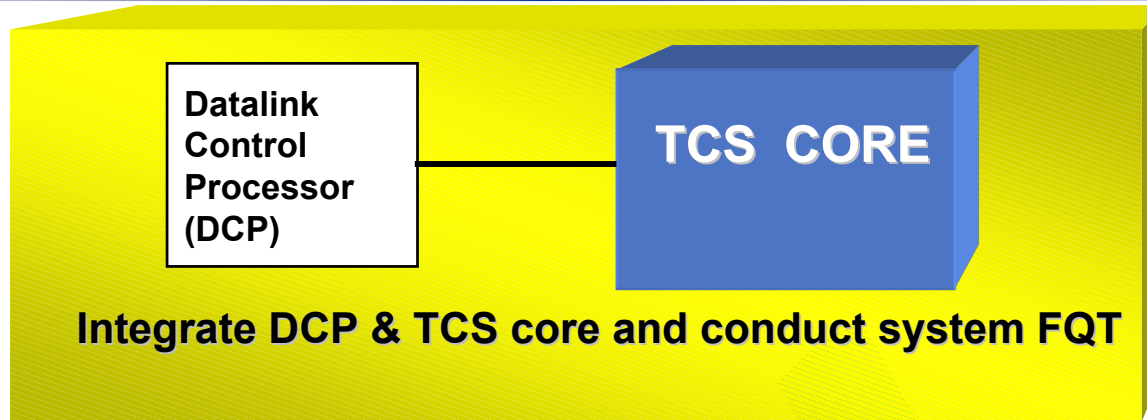
- Conduct system integration tests
- Conduct ground tests
- Conduct flight tests
- Obtain system certification

TUAV-TCS REQUIREMENTS SUMMARY

JROCM 034-99 - 22 Mar 99

2c. The TCS Software will provide, up to and including, Level V interoperability with future Tactical Unmanned Air Vehicles (TUAVs)….

TUAV ORD 11 Mar 99

(a) The TUAV GCS will consist of subassemblies that weigh no more than 100 pounds (45.63 kilograms). The TUAV GCS will be
   8. Compatible with the TCS Architecture, as defined by the TCS ORD, 3 Feb 97 (threshold).

(2) Software. The TUAV system software will be maintained through standard Army life cycle software support concepts, to include CLS. The TUAV system software will be updated, as required, to ensure compatibility with Military Intelligence, Aviation, and targeting systems. TUAV system software, to include embedded TCS software, will retain compatibility with older fielded systems and provide improved performance through Pre-planned Product Improvements (P3I).

(g) The RVT will be TCS level 2 compatible, as defined in the TCS ORD, 3 Feb 97.

(3) Interoperability with other UAV systems is required using TCS.

(4) Compatibility with the TCS Architecture is required (threshold).

TUAV RDD - 25 Mar 99

The TUAV GCS shall be compatible with the TCS architecture.

The TUAV GCS shall be interoperable with other UAV systems using TCS.

TUAV TEMP - 10 Aug 99

Interoperability with other UAV systems is required using TCS when TCS software is available.

The overall T&E operational objective is to evaluate the operational effectiveness, suitability, and survivability of the TUAV system integrated with a TCS, using three critical operational issues identified in the following paragraph and their associated criteria. The TCS will be evaluated in terms of its ability to meet the TCS COICs.

Currently, the P#I are (1) Advanced EO/IR Payload, (2) TCDL, and (3) TCS software. The Block II TUAV system will be tested during follow-on DT&E (FDT&E) after MS III.

DT&E Objectives: To ensure that TCS software is successfully developed and properly integrated (including IV & V and certification) into the TUAV system as early as practical, with the current schedule for TUAV IOT&E as an initial goal for successful completion of required activities.

Upon commencement of the EMD/LRIP phase (i.e., a TUAV contractor is selected), parallel plans/activities will be developed in coordination with the JTUAV PMO, the TCS PMO, the JTC/SIL, and the TUAV system contractor. However, the TUAV system contractor will not start TCS software integration activities until a modification has been completed on their contract for the TUAV system.

DOT&E Memorandum - 24 Aug 99

… each Service is expected to incorporate the TCS into their specific UAV systems, and to provide up to and including Level 5 (take-off and landing) capability within the Navy VTUAV and the Army TUAVs.

Since the requirements documents for the Navy VTUAVs and the Army TUAVs include these TCS capabilities, this office will require testing of TCS as part of the IOT&E test strategy which supports a Milestone III production decision…

… Army and Navy must include Level 4 TCS operations with U.S. Air Force Predator during their respective TUAV IOT&E.

TCS ORD - Under review

b. System Description. The Tactical Control System (TCS) is the software, software related hardware and the ancillary ground support hardware (antenna, cabling, etc.) necessary for the command and control of the Tactical Unmanned Aerial Vehicles (TUAVs).

For the U.S. Army and the U.S. Marine Corps, the TCS will be an integral part of the TUAV (includes VTUAV) Ground Control Station(s) (GCS).
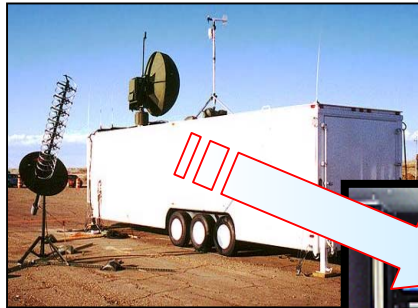
c. Operational Concept. The TCS will provide the common software architecture between MAE UAV, TUAV, future Tactical and MAE UAVs. The TCS will enable joint warfighter interoperability with the families of MAE and TUAV systems.
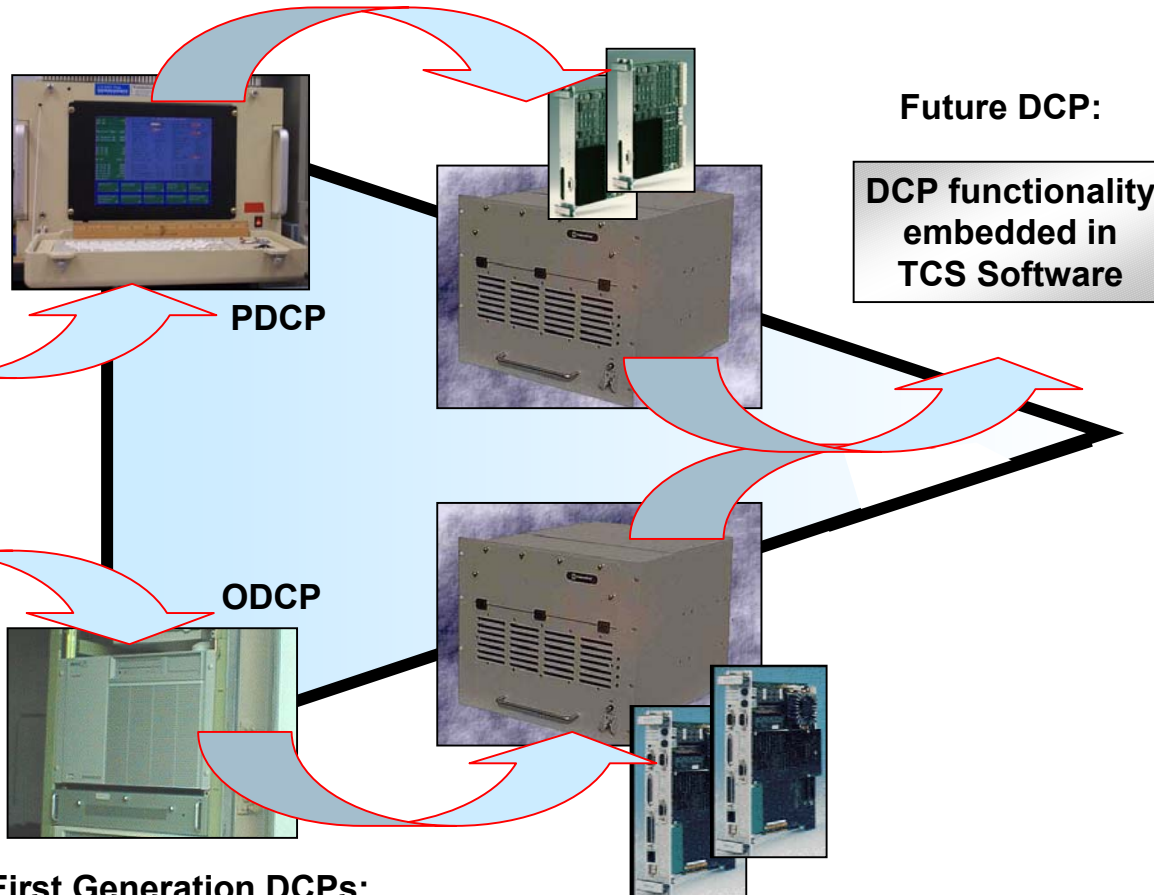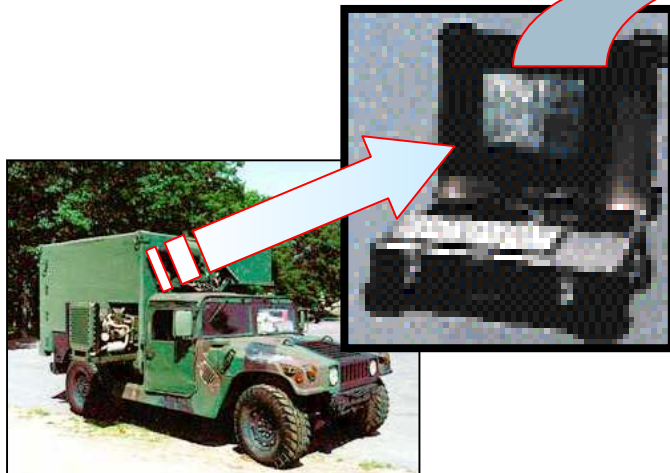
E-2C AIRBORNE TCS
BATTLESPACE COMMAND AND CONTROL

TCDL

Link 16

Tracks

Airborne TCS

Shipboard TCS

VTUAV

DATALINK CONTROL PROCESSOR - DCP EVOLUTION

Prior to TCS

PDCP

ODCP

Future DCP:

DCP functionality embedded in TCS Software

First Generation DCPs:
- AV OEM VME Cages
- Multiple Circuit Card Assemblies
- AV Vendor Determined Configurations

Next Generation DCP:
- Standard VME Cages
- Minimum Card Assemblies